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(54) ALKALINE EARTH ALUMINATE PHOSPHOR, PHOSPHOR PASTE COMPOSITION, AND VACUUM ULTRAVIOLET-EXCITED LUMINESCENT ELEMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an alkaline earth aluminate phosphor which has a high luminescence efficiency, is free of luminance degradation due to VUV (vacuum ultraviolet vibration), and emits blue light with a good color purity; and to obtain a phosphor paste composition and to provide a VUV-excited luminescent element, both using the phosphor.
SOLUTION: The alkaline earth aluminate phosphor is represented by the general formula: a (MII1-x-yEuxMI2y)O-Al12-z-kMIIIzMIII'kO18 (wherein MII is at least one of Ba, Sr and Ca; MI is Li and/or Ti; MIII is at least either B or La; MIII' is at least one of Sc, Y, Gd, In, Ga, Ce, Tm, Yb and Bi; $0.9 \leq a \leq 1.8$; $0 < x < 1$; $0 \leq y < 1$; $0 \leq z \leq 2$; and $0 \leq k \leq 2$, provided that $x+2Y < 1$ and $0 < y+z$). Both the phosphor paste composition and the VUV-excited luminescent element are prepared by using the above phosphor.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]
General formula
a(MII1-x-yEuxMI2y) O-aluminum12-z-kMIIIzMIII'kO18
The alkaline earth aluminate fluorescent substance come out of and expressed. (However, MII expresses at least one sort of alkaline-earth-metal elements in Ba, Sr, and calcium among said formula, MI is at least one sort in Li and Tl, MIII is at least one sort in B and La, and MIII' is at least one sort in Sc, Y, Gd, In, Ga, Ce, Tm, Yb, and Bi.) Moreover, ax, y, z, and k express the number which fulfills 0.9<=a<=1.8, 0< x<1, 0<=y<1, 0<=z<=2, 0<=k<=2, x+2y<1, and the conditions that become 0<y+z, respectively.
[Claim 2]
The alkaline earth aluminate fluorescent substance according to claim 1 characterized by having a broad band-like peak over the include-angle field whose angle of diffraction (2theta) of this spectrum is 28 degrees - 31 degrees in the powder diffraction X-ray spectrum by the CuKalpha1 characteristic X ray of said fluorescent substance.
[Claim 3]
The alkaline earth aluminate fluorescent substance according to claim 1 or 2 characterized by being the fluorescent substance for vacuum-ultraviolet-radiation excitation with which said fluorescent substance emits light under vacuum-ultraviolet-radiation excitation with a wavelength of 200nm or less.
[Claim 4]
The fluorescent substance paste constituent with which this fluorescent substance is characterized by being an alkaline earth aluminate fluorescent substance given in any 1 term of claims 1-3 in the fluorescent substance paste constituent which comes to carry out distributed content of the fluorescent substance into the solvent which dissolved the binder.
[Claim 5]
The fluorescent substance paste constituent according to claim 4 characterized by the content of said fluorescent substance being 5 - 70 % of the weight.
[Claim 6]
The vacuum-ultraviolet-radiation excitation light emitting device characterized by using a vacuum-ultraviolet-radiation excitation alkaline earth aluminate fluorescent substance given in any of claims 1-3 they are for this fluorescent screen in the vacuum-ultraviolet-radiation excitation light emitting device which excites this fluorescent screen with the vacuum ultraviolet radiation emitted by discharge of the rare gas enclosed in the vacuum envelope by which the fluorescent screen was formed in the interior, and is made to emit light.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
Especially this invention relates to the vacuum-ultraviolet-radiation (VUV) excitation light emitting device which brightness degradation may make maintain luminescence efficient few at the alkaline earth aluminate fluorescent substance with which wavelength presents little blue luminescence of high brightness of brightness degradation under excitation by vacuum ultraviolet radiation (VUV) 200nm or less, and the fluorescent substance paste constituent list which used this fluorescent substance.
[0002]
[Description of the Prior Art]
For example, so that it may be represented by a rare-gas lamp, a plasma display panel (PDP), etc. which are used for the light source for read of a scanner While forming the fluorescent screen which used the fluorescent substance which emits light under excitation by VUV in the envelope which consists of glass etc. Or it mixes and encloses, the inside of it — rare gas, such as Ar, Xe, helium, and Ne, — a simple substance — Development of a VUV excitation light emitting device with the structure and the function to excite the fluorescent screen in an envelope and to make it emit light by VUV emitted by making the enclosed rare gas discharge is performed briskly in recent years, and is put in practical use.
[0003]
As a fluorescent substance used as a fluorescent screen of this VUV excitation light emitting device, conventionally Red fluorescent substances, such as BO(Y, Gd)3:Eu, LaPO4: — Ce, Tb, Zn2SiO4:Mn, and BaAl12O19:Mn — (Ba, Sr, Mg) green luminescence fluorescent substances, such as O-aAl2O3:Mn and YBO3:Tb, BaMgAl10O17:Eu, and MgAl(Ba, Sr) 10O17: — blue luminescence fluorescent substances, such as Eu and Mn, etc. — a single — or it is mixed and used.
As a property of the fluorescent substance used as a fluorescent screen of a VUV excitation light emitting device What (there is little brightness degradation by baking) the luminescence brightness as a fluorescent screen does not fall in case a fluorescent substance paint film receives the baking processing around 500 degrees C with the fluorescent screen formation process of emitting light in high brightness more under excitation by VUV, and a VUV excitation light emitting device, Even if it carries out long duration actuation of the VUV excitation light emitting device and is continuously exposed to VUV, it is required that a fluorescent substance has few brightness falls (brightness degradation by VUV), that the color purity of the luminescent color should be good, etc.
** and the fluorescent substance by which current utilization is carried out do not satisfy all of these properties, either.
On the other hand, in the commercial scene, there is always much more improvement demand of many properties of a VUV excitation light emitting device, and development of a new fluorescent substance with the above-mentioned property good also about the fluorescent substance for VUV excitation is expected.

[0004]
by the way, the inside of the fluorescent substance for VUV excitation — blue with a typical aluminate fluorescent substance thru/or the fluorescent substance for VUV excitation of bluish green color luminescence — it is — BaMgAl10O17:Eu and MgAl(Ba, Sr) 10O17: — Eu divalent to the aluminate of the alkaline earth metal which contains Mg as indispensable as host crystal, or Eu and Mn, such as Eu and Mn, — an activator — carrying out
The fluorescent substance called ** and a common-name BAM fluorescent substance is put in practical use as the blue for VUV excitation excellent in luminescence properties, such as luminescence brightness, thru/or a bluish green color luminescence fluorescent substance.
However, especially this BAM fluorescent substance is a fluorescent substance with which brightness degradation by VUV had a large fault in the brightness degradation list by baking, and development of the fluorescent substance for VUV excitation of little blue luminescence of brightness degradation by baking which replaces this, or brightness degradation by VUV thru/or a bluish green color is desired.
[0005]
[Problem(s) to be Solved by the Invention]
This invention is alkaline earth aluminate fluorescence which development of the new fluorescent substance for VUV excitation of blue luminescence is meant, it is made, luminous efficiency is high, and there is especially little brightness degradation by VUV as a fluorescent substance for VUV excitation, and presents good blue luminescence of color purity.
It aims at providing the fluorescent substance paste constituent list using the body and this fluorescent substance with a VUV excitation light emitting device.
[0006]
[Means for Solving the Problem]
In order that this invention person etc. might attain the above-mentioned purpose, the alkaline earth aluminate fluorescent substance of the various presentations which used Eu as the activator was examined in the detail, and brightness degradation according [the fluorescent substance expressed with general formula a(MII1-xEux) O and 6aluminum 2O3] to VUV found out few things as a fluorescent substance for VUV excitation previously (refer to application for patent No. 245132 [2001 to]).
Furthermore, when this invention person etc. made the fluorescent substance expressed with general formula a(MII1-xEux) O and 6aluminum 2O3 contain at least one sort of metallic elements in Ga, Ce, Tm, Yb, and Bi, it found out that the color purity as the luminescent color of this fluorescent substance being blue was improved more. (refer to application for patent No. 143524 [2002 to]) .
The artificer etc. found out that brightness degradation by VUV of this fluorescent substance chosen as the fluorescent substance expressed with this general formula a(MII1-xEux) O and 6aluminum 2O3 from Sc, Y, Gd, and In further again if a kind is made to contain at least decreased (refer to application for patent No. 143525 [2002 to]).
[0007]
this invention person etc. about the fluorescent substance expressed with above-mentioned general formula a(MII1-xEux) O and 6aluminum 2O3 The above description **1 **2 with little brightness degradation Color purity is good. As a result of holding and adding examination wholeheartedly about the strong improvement in brightness of an improvement request further, at least to this fluorescent substance **1 The metallic element of the group of a lithium (Li) and a thallium (Tl), and/or **2 The amount content of specification of boron (B) and the metallic element of the group of a lanthanum (La) is carried out.
It resulted that the luminous efficiency by ** and VUV excitation became high, and the above-mentioned purpose was attained in header this invention.
That is, this invention consists of the following configurations.
(1) General formula Alkaline earth aluminate fluorescent substance expressed with a(MII1-x-yEuxMI2y) O-aluminum12-z-kMIIIzMIII'kO18. (However, MII expresses at least one sort of alkaline-earth-metal elements in Ba, Sr, and calcium among said formula, MI is at least one sort in Li ** ** Tl, MIII is one sort in B and La at least, and MIII' is at least one sort in Sc, Y, Gd, In,

Ga, Ce, Tm, Yb, and Bi.) Moreover, ax, y, z, and k express the number which fulfills 0.9<=a<=1.8, 0< x<1, 0<=y<1, 0<=z<=2, 0<=k<=2, x+2y<1, and the conditions that become 0<y+z, respectively.
[0008]
(2) The powder diffraction X-ray-spectrum smell by the CuKalpha1 characteristic X ray of said fluorescent substance
The above characterized by having a broad band-like peak over the include-angle field whose angle of diffraction (2theta) of ** and this spectrum is 28 degrees - 31 degrees (1) Alkaline earth aluminate fluorescent substance of a publication.
(3) The above (1) characterized by being the fluorescent substance for vacuum-ultraviolet-radiation excitation with which said fluorescent substance emits light under vacuum-ultraviolet-radiation excitation with a wavelength of 200nm or less, or an alkaline earth aluminate fluorescent substance given in (2).
[0009]
(4) The fluorescent substance paste constituent characterized by this fluorescent substance being an alkaline earth aluminate fluorescent substance given in any of aforementioned (1) - (3) they are in the fluorescent substance paste constituent which comes to carry out distributed content of the fluorescent substance into the solvent which dissolved the binder.
(5) The above characterized by the content of said fluorescent substance being 5 - 70 % of the weight (4) Fluorescent substance paste constituent of a publication.
(6) The vacuum-ultraviolet-radiation excitation light emitting device characterized by using a vacuum-ultraviolet-radiation excitation alkaline earth aluminate fluorescent substance given in any of aforementioned (1) - (3) they are for this fluorescent screen in the vacuum-ultraviolet-radiation excitation light emitting device which excites this fluorescent screen with the vacuum ultraviolet radiation emitted by discharge of the rare gas enclosed in the vacuum envelope by which the fluorescent screen was formed in the interior, and is made to emit light.
[0010]
[Embodiment of the Invention]
Hereafter, this invention is explained to a detail.
The alkaline earth aluminate fluorescent substance of this invention at least one sort of alkaline earth elements chosen from 1Ba which is a parent configuration raw material, and the group which consists of Sr and calcium (MII) 2) — aluminum element and 3 — at least a kind of element (MI) chosen from the group which consists of Li and Tl — 4) At least 1 chosen from the group which consists of B and La The element (MIII) and 5Sc of a seed, At least 1 chosen from the group which consists of Y, Gd, In, Ga, Ce, Tm, Yb, and Bi It is ** with the element (MIII') and activator of a seed. Each oxide of a ** 6Eu element, Or they are compounds, such as a carbonate of each element of these 1-6, a sulfate, and a halogenide, to stoichiometric a(MII1-x-yEux MI2y) O-
aluminum12-z-kMIIIzMIII'kO18 (however, among said formula) MII is Ba, Sr, and calcium. At least one sort of inner alkaline-earth-metal elements are expressed. MI — Li and Tl it is at least one inner sort, and MIII is at least one sort in B and La — MIII' is at least one sort in Sc, Y, Gd, In, Ga, Ce, Tm, Yb, and Bi.
[0011]
moreover, ax, y, z, and k — respectively — 0.9<=a<=1.8 and 0< x — <
The number which fulfills 1, 0<=y<1, 0<=z<=2, 0<=k<=2, x+2y<1, and the conditions that become 0<y+z is expressed. Hereafter, the alkaline earth aluminate fluorescent substance of this invention can be manufactured being the same and by performing distribution, rinsing, desiccation, and many processings of sieving like the tail end process which **** at a becoming rate, mixes enough the fluorescent substance raw material compound which consists of such mixture, fills up heat-resistant containers, such as alumina crucible, calcinates, and is applied to the obtained baking object at the time of the usual fluorescent substance manufacture. In addition, it sets to this invention and is a general formula, Fluorescent substance expressed with a(MII1-x-yEux MI2y) O-aluminum12-z-kMIIIzMIII'kO18 The fluorescent substance with which the percentage (gram atom ratio) of each metallic element of MI, MII and aluminum in a fluorescent substance, MIII, MIII', and Eu is satisfied of the above-mentioned empirical formula is said.

[0012]
In the above-mentioned empirical formula, a value is smaller than 0.9, or since the fluorescent substance which whose amount of mixture of an impurity component increased in chemical composition when it was size, and excelled [brightness / high] 1.8 in VUV-proof nature is not obtained, it is not desirable. Therefore, in order to obtain the fluorescent substance which emits light in high brightness under VUV excitation, it is desirable that a value is in 0.9<=a<=1.8, and it is more desirable that it is in the range of 1.1<=a<=1.5 especially. As for z, it is desirable that it is in the range of 0<=y<1, 0<=z<=2, and 0<y+z<=3, respectively in the addition y list of MI added in order to raise the luminescence brightness under VUV excitation more, and MIII, and it is still more desirable in it that it is at the range of 0<=y<=0.25, 0<=z<=1, and 0<y+z<=1.25. Since [neither of] the luminescence brightness of the fluorescent substance which will be obtained if a y+z value serves as size from 3 when it is size, and z value is size from 2 or falls remarkably from 1, y value is desirable.
[0013]
Moreover, in the fluorescent substance of this invention, in order to control VUV brightness degradation of a fluorescent substance or to consider as the fluorescent substance with more good color purity which emits light blue MI metallic element — and/or — Although a MIII' metallic element may be added with a MII metallic element MIII' in that case When it is necessary to make an addition (k value) or less into two and is in the range of 0<=k<=1 especially, the fluorescent substance which presents good luminescence of the depressor effect of brightness degradation by VUV of the fluorescent substance obtained or color purity is obtained. And since the luminescence brightness of the fluorescent substance which will be obtained if k value becomes size from 2 falls remarkably, it is not desirable.
As for the content (x values) of Eu which is an activator, it is desirable to consider as the range of 0< x<1 in respect of the luminescence brightness of a fluorescent substance, and it is desirable especially to consider as the range of 0.03<=x<=0.5.
[0014]
Moreover, as for the alkaline earth aluminate fluorescent substance of the viewpoint of the luminescence brightness (resultant stimulus) when carrying out VUV excitation to this invention, it is desirable that the MII element which constitutes some host crystal of a fluorescent substance is Ba, or they are less than [50 mol %] and the alkaline-earth-metal element which permuted Ba not more than 20 mol % by at least one in Sr and calcium more preferably.
In addition, it is a fluorescent substance raw material compound like the case of the conventional alkaline earth aluminate fluorescent substance manufactures, such as a BAM fluorescent substance, in the fluorescent substance raw material compound with which baking is presented, using fluorides, such as AlF3, and BaF2, HF (NH4)2, as flux for promotion of a reaction. You may add in mixture.
[0015]
A fluorescent substance raw material compound is calcinated once or more over 2 - 40 hours in a reducing atmosphere according to the fill at the temperature of 1300-1800 degrees C.
If it no longer accepts gradually, sufficient luminescence brightness under VUV excitation is not obtained when becoming large [extent of brightness degradation by VUV] with it, and the above-mentioned broad peak in the powder diffraction X-ray spectrum of the fluorescent substance which will be obtained if burning temperature is made lower than 1300 degrees C is made higher than 1800 degrees C, it will consume unnecessary energy and is not industrially desirable.
[0016]
Moreover, in order to acquire the reducing atmosphere at the time of baking, the approach that the approach of embedding a graphite and activated carbon into the crucible with which the fluorescent substance raw material compound was filled up, the approach of embedding the crucible filled up with the fluorescent substance raw material compound in the crucible filled up with a graphite or activated carbon, the approach of calcinating in the mixture of gas of nitrogen and hydrogen, etc. are conventionally well-known is mentioned.
Furthermore, the steam may be contained in the firing environments.

[0017]
The alkaline earth aluminate fluorescent substance of this invention general formula a(M1- X, EuX) O and 6aluminum 2O3 (M:Ba, and Sr and calcium — at least — a kind —) given in an application-for-patent No. 144595 [2002 to] specification Like 0< x<1 and the alkaline earth aluminate fluorescent substance expressed with 0.9<=a<=1.8 A broad peak is observed in the include-angle field whose angle of diffraction (2theta) in the powder diffraction X-ray spectrum by the CuKalpha1 characteristic X ray of this fluorescent substance is 28-31 degrees too, and it is the content (y value) of MI element in a crystal parent.
These elements are contained when the content (z value) of a MIII element is in above-mentioned within the limits. Spectrum distribution **** almost similar to the powder diffraction X-ray spectrum of the alkaline earth aluminate fluorescent substance expressed with above-mentioned general formula a(M1- X, EuX) O and 6aluminum 2O3 which is not
There is so few extent of brightness degradation by VUV of the fluorescent substance that the reinforcement of the peak whose angle of diffraction [in / it carries out and / a powder diffraction X-ray spectrum] (2theta) is 28-31 degrees is size.
It was checked that it is the same as that of the case of the alkaline earth aluminate fluorescent substance expressed with ** and an application-for-patent No. 144595 [2002 to] specification with general formula a(M1- X, EuX) O and 6aluminum 2O3 of a publication.
[0018]
Moreover, the alkaline earth aluminate fluorescent substance of this invention When calcinated at 1300 degrees C - 1800 degrees C As opposed to applying to the include-angle field whose angle of diffraction (2theta) of this spectrum is 28 degrees - 31 degrees in a powder diffraction X-ray spectrum, and a weak broad peak being accepted That this peak is not accepted in the include-angle field whose angle of diffraction (2theta) is 28 degrees - 31 degrees at all in a powder diffraction X-ray spectrum when calcinated at temperature lower than 1300 degrees C It was the same as that of the case of the alkaline earth aluminate fluorescent substance expressed with an application-for-patent No. 144595 [2002 to] specification with general formula a(M1- X, EuX) O and 6aluminum 2O3 of a publication.
[0019]
in addition, the above-mentioned powder diffraction X-ray spectrum of the fluorescent substance of this invention — setting — this angle of diffraction (2theta) the small and sharp peak locally believed to be the broad band-like peak seen over the include-angle field which is 28 degrees - 31 degrees — not but Although a broadcloth peak (half-value width is 0.5 degrees or more) is said It is more desirable at the point that that the broad full width at half maximum in the include-angle field this angle of diffraction (2theta) of whose is 28 degrees - 31 degrees is 0.5 degrees or more and 1 more degrees or more raises the luminescence brightness under VUV excitation more, and brightness degradation by VUV may be controlled more.
[0020]
Next, the fluorescent substance paste constituent of this invention is described.
The fluorescent substance paste constituent of this invention contains the component currently used in the conventional fluorescent substance paste constituent except using the alkaline earth aluminate fluorescent substance of this invention obtained as mentioned above as fluorescent substance powder.
The fluorescent substance paste constituent of this invention is manufactured like the case where the conventional fluorescent substance paste constituent is manufactured, except using the alkaline earth aluminate fluorescent substance of this invention. For example, while fully agitating and kneading the mixture which carried out specified quantity mixing of the alkaline earth aluminate fluorescent substance of this invention, and the solvent in which binder resin was dissolved, respectively and distributing a fluorescent substance, it can obtain by adjusting to the viscosity which suited the purpose of use.
[0021]
In order to use ethyl cellulose, a nitrocellulose, polyethylene oxide, acrylic resin, etc. according to the purpose of use on the occasion of manufacture of the fluorescent substance paste constituent of this invention as binder resin used with the above-mentioned alkaline earth

aluminate fluorescent substance and to distribute a fluorescent substance and binder resin, as a solvent used with a fluorescent substance and binder resin for viscosity control, water, butyl acetate, butyl carbitol, butyl carbitol acetate, the Tell Young Pioneers, etc. are mentioned. As for the loadings of an alkaline earth aluminate fluorescent substance, it is desirable to consider as 5 - 70 % of the weight to the total weight of the fluorescent substance and binder resin except a solvent, to mix with the solvent which dissolved binder resin with this fluorescent substance, to agitate and knead this, and to add and carry out viscosity control of the solvent finally in respect of control of film thickness, the workability of spreading, etc.
[0022]
Next, the VUV excitation light emitting device of this invention is explained in full detail.
When manufacturing the rare-gas lamp which is one of the VUV excitation light emitting devices of this invention For example, flow coating of the fluorescent substance paste constituent of this invention which had viscosity adjusted even from the end of the transparent glass capillary which has a desired bore to extent which can flow a tubing internal-surface top is carried out.
[whether this is dried, baking processing is carried out further, and baking vaporization of the organic substance component is carried out, and] Or after putting the glass plate which carried out spreading desiccation of the fluorescent substance paste constituent into the interior of a glass capillary, After exhausting the interior of the glass tube, in tubing, a small amount of rare gas is enclosed, an electrode is attached in both sides to which inside-and-outside both sides which sandwich the both ends or glass tube wall of a glass capillary, or the exterior of a glass tube countered, and the both ends of the glass tube are stopped. Thus, it considers as the rare-gas lamp which is one of the VUV excitation light emitting devices of this invention.
[0023]
Moreover, when PDP which is other one example of the VUV excitation light emitting device of this invention is manufactured
An internal electrode is formed in tooth-back plates, such as **, for example, a glass plate etc., the septum of the shape of the shape of a stripe and a matrix is formed, two or more cels are constituted, and red, green, and a blue fluorescent substance paste constituent are applied to a wall by approaches, such as screen printing, at red, green, and the pars-basilaris-ossis-occipitalis list of each septum which constitutes a cel for every blue color. The fluorescent substance paste constituent of this invention is used as a blue fluorescent substance paste.
While drying and baking this and forming a fluorescent screen in each cel, after carrying out opposite arrangement of the front plate which consists of a glass plate with which a tooth-back plate and fixed spacing were separated, and the internal electrode was formed, stopping the perimeter of a front plate and a tooth-back plate and exhausting the interior, rare gas is enclosed and it is referred to as PDP which is one of the VUV excitation light emitting devices of this invention.
In addition, outside the above-mentioned rare-gas lamp or PDP, the VUV excitation light emitting device of this invention encloses rare gas in the envelope in which the fluorescent substance paste constituent of this invention was applied to the front face of the base material used as the luminescence side in an envelope [in / not related / how / gestalt / the class / each VUV excitation light emitting device] by the well-known approach, this was dried, baking processing was carried out, each fluorescent screen was formed in, and the fluorescent screen was formed, and is manufactured.
Thus, the VUV excitation light emitting device of obtained this invention can obtain the VUV excitation light emitting device of high brightness with few falls of working luminescence brightness.
[0024]
[Example]
Next, this invention is not limited by the following examples, although the example of this invention is given with the example of a comparison and this invention is explained concretely.
[Example 1A]
BaCO3 : 1.0288 Mol
Eu 2O3 : 0.0643 Mol

aluminum 2O3 : 6 Mol
Li2CO3 : 0.2572 Mol
AlF3 : 0.05 Mol
After mixing enough each above-mentioned fluorescent substance raw material, it calcinated over 24 hours including rising-and-falling-temperature time amount at 1600 degrees C of maximum temperatures in the nitrogen which filled up alumina crucible, put in the graphite, covered and contained the steam. Subsequently, alkaline earth aluminate fluorescence of example 1A whose empirical formula baking powder is sifted and is 1.288 (Ba0.8 Eu0.1 Li0.2) O-aluminum 12O18 The body was acquired.
[0025]
Put this fluorescent substance powder in a cel, irradiate VUV with a wavelength of 146nm, and a luminescent chromaticity point (x values, y value) is measured in that luminescence brightness list with a luminance meter. If the resultant stimulus (brightness/y) of the fluorescent substance powder of example of the following comparison 1A measured on the same conditions as this is set to 100 when it asks for the resultant stimulus (brightness/y) which is the value which **(ed) luminescence brightness with y value of the chromaticity coordinate of the luminescent color
The resultant stimulus (brightness/y) of the fluorescent screen which consists of a fluorescent substance paste constituent of an example 1 was 113.0.
In addition, although the brightness of a blue luminescence fluorescent substance changes a lot in proportion to the luminescent color (y value of a chromaticity point), generally comparing with the value which considered as the simple approach of carrying out the mutual comparison of the luminous efficiency between the fluorescent substances with which the luminescent color (y value) differs, and broke brightness by y value is performed. Then, also in this invention, the measured value of luminescence brightness carried out the relative comparison mutually in quest of the resultant stimulus (brightness/y) of the above-mentioned definition, respectively.
[0026]
[Example 1B]
The ethyl cellulose of the butyl carbitol acetate of the alkaline earth aluminate fluorescent substance of the above-mentioned example 1A of 30 weight sections, the butyl carbitol of 10 weight sections, and 53 weight sections and 7 weight sections was fully kneaded, and the fluorescent substance paste constituent of example 1B was manufactured.
[0027]
[Example 1C]
The fluorescent substance paste constituent of example 1B obtained as mentioned above was applied on the glass plate with a width of face of 2mm, and was calcinated at 500 degrees C after 60-minute desiccation by 120 degrees C for 30 minutes. After having held this glass plate in the glass tube with an outer diameter of 4mm, attaching the electrode of nickel to the both ends of this glass tube and exhausting the inside of tubing to a vacuum, 50Torr enclosure of Ne98%-Xe2% of the gas was carried out, and the VUV excitation light emitting device (rare-gas lamp) of example 1C was produced.
The resultant stimulus (brightness/y) of the compounding ratio of the fluorescent substance raw material used when the fluorescent substance of example 1A was manufactured to Table 1, and the fluorescent substance powder of example 1A is shown, respectively.
[0028]
[Table 1]

実施例 / 比較例	原料化合物中の各金属元素とその配合比										飽和
	金属種	配合量	金属種	配合量	金属種	配合量	金属種	配合量	金属種	配合量	(%)
実施例1	Ba	1.0288	Eu	0.1286	Al	12	$Li_{(M1)}$	0.2572	$La_{(M^{III})}$	0.12	113.0
2	Ba	1.0288	Eu	0.1286	Al	12	$Ti_{(M1)}$	0.2572	$B_{(M^{III})}$	0.12	104.1
3	Ba	1.1574	Eu	0.1286	Al	11.88	$La_{(M^{III})}$	0.12	-	0	104.1
4	Ba	1.1574	Eu	0.1286	Al	11.88	$B_{(M^{III})}$	0.12	-	0	104.1
比較例1	Ba	1.1574	Eu	0.1286	Al	12	-	0	-	0	100

[0029]
[Examples 2A-4A, example of comparison 1A]

The fluorescent substance of example of comparison 1A was obtained in example 2A ~ 4A list like example 1A except having used the fluorescent substance raw material of the compounding ratio shown in Table 1.

[0030]

[Example 2B-4B, example of comparison 1B]

The fluorescent substance paste constituent of example 2B-5B and example of comparison 1B as well as the fluorescent substance paste constituent of example 1B was manufactured except having replaced with the fluorescent substance of example 1A, and having used each fluorescent substance of Examples 2A-4A and example of comparison 1A.

[0031]

[Examples 2C-4C, example of comparison 1C]

The VUV excitation light emitting device of Examples 2C-4C and example of comparison 1C as well as the VUV excitation light emitting device of example 1C was manufactured except having replaced with the fluorescent substance paste constituent of example 1B, and having created the fluorescent screen using each fluorescent substance paste constituent of example 2B-4B and example of comparison 1B.

[0032]

the resultant stimulus of luminescence in VUV excitation of the alkaline earth aluminate fluorescent substance of this invention which contains MI metallic element or a MIII metallic element as shown in Table 1 — MI Good compared with it of the fluorescent substance of the example of a comparison which does not contain a metallic element or a MIII metallic element it was .

[0033]

[Effect of the Invention]

Eu activation alkaline earth aluminate fluorescent substance of this invention and the fluorescent substance paste constituent using this present efficient blue luminescence by VUV excitation with a wavelength of 200nm or less, and since there is little brightness degradation by VUV, it becomes possible [the VUV excitation light emitting device manufactured using the fluorescent substance paste constituent of this invention] for change of the luminous efficiency under long duration actuation to maintain little luminescence of high brightness.

[Translation done.]